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EXAMINER

EVERHART, CARIDAD

ART UNIT PAPER NUMBER

2891

DATE MAILED: 04/08/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/827,202

Applicant(s)

ADETUTU ET AL.

Examiner

Caridad M. Everhart

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-39 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 29-39 is/are allowed.
- 6) ☒ Claim(s) 1-4 and 23-28 is/are rejected.
- 7) ☒ Claim(s) 5-22 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>4-26-2004</u> | 6) <input type="checkbox"/> Other: ____ |

Claim Objections

Claims 23 and 24 are objected to because of the following informalities: the recitations of the first metal layers including the recited materials seems to not be consistent, in that the recited materials are compounds, rather than metals in the case of claim 23, and many of the materials recited in claim 24 are compounds. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-4, and 26-28 are rejected under 35 U.S.C. 102(e) as being anticipated by Chen, et al. (US 2004/0198009A1).

Chen, et al disclose the steps of forming a gate metal on a first gate dielectric portion of a substrate(in which the layer 16 is the gate oxide, layer 46 is conductive layer and layer 44 is tungsten(paragraph 0052, and 0056 and Fig. 11), while the gate dielectric in a second portion of the substrate is protected by layer 18 shown in Fig. 11, which is interpreted as selectively forming the conductor on the first portion of the gate dielectric on the substrate. Chen, et al further teach that one portion is NMOS and the other is

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PMOS(paragraph 0053). Layer 38 shown in Fig. 13 is a different metal from that in the first gate(paragraph 0063). The first metal layer can be deposited by CVD(paragraphs 0055 and 0056). Although Chen, et al teach a polysilicon layer and a silicide as the first conductive layer, this is not excluded by the claims, as claim 27 includes the deposition of polysilicon and metal layers. The metals in the first and second gates have different work function, as the metals are different metals.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was

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not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 23-24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al as applied to claim 1 above.

Although Chen et al does not specifically teach that the recited materials are included in the first metal layer, because of the difficulty in interpreting the claims as cited in the Claim Objections above, the disclosure made by Chen et al (paragraph 0063) that the layer which includes $\text{Si}_3\text{N}_4/\text{Al}_2\text{O}_3$ which is a metal silicon nitride material and the including of titanium nitride by Chen et al is interpreted as satisfying the limitations of claims 23 and 24.

Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chen et al as applied to claim 1 above, and further in view of Forbes, et al. (US 2004/0140513A1).

Chen et al does not teach ALD.

Forbes et al teaches ALD for the deposition of layers in the formation of gates of different work functions (paragraph 0019 and 0032).

It would have been obvious to one of ordinary skill in the art at the time of the invention to have applied the method taught by Forbes et al to the process taught by Chen et al because Chen et al teaches many of the same materials as does Forbes et al for the same purpose, that is the formation of gates of different work functions, and because

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Forbes et al teaches that ALD is a modification of CVD(paragraph 0021), which is taught by Chen et al .

Allowable Subject Matter

Claims 29-39 are allowed.

Claims 5-22 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The prior art of record does not teach the limitation "forming an inhibitor on the gate dielectric of the second region".

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Caridad M. Everhart whose telephone number is 571-272-1892. The examiner can normally be reached on Monday through Fridays 7:30-4:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, B. Baumeister can be reached on 571-272-1722. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Handwritten signature and initials. The signature appears to be "Caridad M. Everhart" and is followed by several sets of initials, including "CE", "B. Baumeister", and "703-872-9306".

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C. Everhart
4-5-2005


CARIDAD EVERHART
PRIMARY EXAMINER